

PATENT ABSTRACTS OF JAPAN

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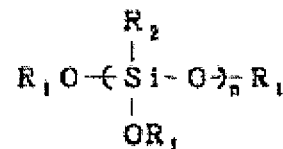
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(54) RESIN COMPOSITION

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a resin composition for forming an excellent coating at a fast curing speed and with corrosion resistance, adherence, curability, solvent resistance and curing product properties by compounding an alkoxy silane compound and a modified epoxy resin added another alkoxy silane compound.

SOLUTION: A resin composition is obtained by compounding an alkoxy silane compound represented by the formula (wherein R1 is 1-4C alkyl; R2 is R1O-, 1-8C alkyl and dryl; n is an integer of 1-10) into an epoxy compound having at least two epoxy groups, and a compound having at least one alkoxy silyl group and at least one epoxy group in a molecule and a modified epoxy resin (C) added a carboxylic acid according to demand. The epoxy compound is preferably aliphatic polyglycidyl ether particularly. The modified epoxy resin (C) is desirable to contain at least 10 mole% of a dicarboxylic acid on the basis of the whole carboxylic acid. A weight ratio of the modified epoxy resin/ the alkoxy silane compound is preferably 10/1-1/5.



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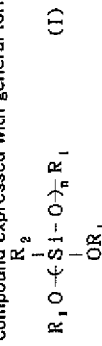
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CLAIMS

[Claim(s)]

[Claim 1] A resin composite which consists of a following (b) ingredient and a (**) ingredient.
 (**) The modified epoxy resin (**) following produced by adding (c) carboxylic acid to an epoxy compound which has two or more epoxy groups in the (a) molecule a compound which has a basis which can react to one or more alkoxy silyl groups and one or more epoxy groups in the (b) molecule, and if needed A compound expressed with general formula (I) of [the-izing 1] [Chemical formula 1]



(式中、R₁は炭素数1～4のアルキル基を表し、R₂はR、O-、炭素数1～8のアルキル基またはアリール基を表し、nは1～10を表す。)

[Claim 2](b) The resin composite according to claim 1 whose basis which can react to an epoxy group of an ingredient is an amino alkyl group.

[Claim 3](**) The resin composite according to claim 1 or 2 whose ingredient is the addition to which the (b) ingredient is added in the range of 0.1-1.0 Eq of active hydrogen to 1 Eq of epoxy groups of the (a) ingredient.

[Claim 4](**) The resin composite according to any one of claims 1 to 3 which is an addition in which an ingredient added the (b) ingredient and the (c) ingredient to the (a) ingredient.

[Claim 5](**) The resin composite according to any one of claims 1 to 4 whose ingredient is the addition to which the (c) ingredient is added in the range of 0.1-0.9 Eq of carboxyl groups to 1 Eq of epoxy groups of the (a) ingredient.

[Claim 6](a) The resin composite according to any one of claims 1 to 5 whose epoxy compound of an ingredient is aliphatic series poly glycidyl ether.

[Claim 7](c) an ingredient — dicarboxylic acid — more than 10 mol % of all the carboxylic acid components — the resin composite according to any one of claims 1 to 6 which is what is included.

[Claim 8](b) The resin composite according to any one of claims 1 to 7 whose blending ratios of an ingredient and a (**) ingredient are (b)/(**) = 10 / 1 - 1/5 in a weight ratio.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]The alkoxy silane compound in which this invention has an epoxy group and a reactant group in an epoxy compound in detail about a resin composite, And it is related with the resin composite which can give the coat excellent in the anti-corrosiveness, the adhesion, hardenability, and solvent resistance which consist of the modified epoxy resin and epoxy group which are produced by adding carboxylic acid if needed, and a nonresponsive alkoxy silane compound.

[0002]

[Description of the Prior Art]Since it excels in an adhesive property, heat resistance, chemical resistance, an electrical property, a mechanical characteristic, etc. over a various substrate, the epoxy resin is especially used widely as a paint, adhesives, etc.
[0003]Although an epoxy resin usually uses hardening agents, such as organic polyamine, together and is used, there are problems, like a cure rate is slow, or the adhesion to the surface of inorganic materials, such as the physical properties of a hardened material especially mortar, and a light-calcium-carbonate board, is insufficient, and it is.

[0004]For this reason, in order to compensate these faults, the trial which is going to make an epoxy resin introduce and harden alkoxy silyl groups is made. for example, the metal antitrust which becomes JP,H1-28832,B from the organic silicon compound which has an amino alkyl group and an alkoxy group, and the compound which has an oxirane ring — business — the constituent is proposed.

The primer containing the resultant of a poly epoxy compound and a silicone compound is proposed by JP,H1-197568,A, and to JP,H3-121171,A. The organic silicon compound which has an amino alkyl group and alkoxy silyl groups, the metal antitrust which consists of monoalkyl ether of the epoxy resin which has two or more hydroxyl groups, paints, and dihydric alcohol — business — the constituent being proposed to or JP H6-16818,A. Although the cathodic electrodeposition gelling particles which carry out moisture powder of the epoxy resin amine addition which has a hydrolytic alkoxy silane group, and construct a bridge in particles are proposed, the adhesion to a wet surface is especially insufficient, and various material surfaces and in order to use it as a paint, there is a problem.

[0005]Therefore, the purpose of this invention has a quick cure rate, and there is in providing the resin composite which can give the paint excellent in anti-corrosiveness, adhesion, hardenability, solvent resistance, and hardened material physical properties.

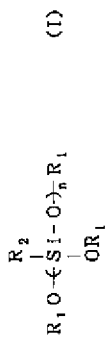
[0006]

[Means for solving problem]The alkoxy silane compound which has an epoxy group and a reactant group in an epoxy compound as a result of this invention persons' repeating examination wholeheartedly, And the resin composite which consists of the modified epoxy resin and epoxy group which are produced by adding carboxylic acid if needed, and a nonresponsive alkoxy silane compound found out that the above-mentioned purpose could be attained, and reached this invention.

[0007]That is, this invention provides the resin composite which consists of a following (b) ingredient and (***) ingredient.

(**) The modified epoxy resin (**) following produced by adding (c) carboxylic acid to the epoxy compound which has two or more epoxy groups in the (a) molecule the compound which has a basis which can react to one or more alkoxy silyl groups and one or more epoxy groups in the (b) molecule, and if needed The compound expressed with general formula (I) of [the-izing 2] [0008]

[Chemical formula 2]



(式中、R₁ は炭素数1～4のアルキル基を表し、R₂ はR₁、O-、放
棄数1～8のアルキル基またはアリール基を表し、nは1～10を表
す。)

[0009]

[Mode for carrying out the invention]Hereafter, the resin composite of this invention is explained in detail.
[0010]As an epoxy compound which is the (a) ingredient of this invention, For example, the poly glycidyl ether compound of mononuclear polyhydric phenol compounds, such as hydroquinone, resorcinol, pyrocatechol, and fluoro GURUKUSHI Norian; Dihydroxynaphthalene, Biphenol, methylenebis phenol (bisphenol F), methylenebis (o-cresol), An ethylenedibisphenol, an isopropylidenebisphenol (bisphenol A), An isopropylidenebisphenol (o-cresol), tetrabromobisphenol A, A 1,3-sorew (4-hydroxy cumyl benzene), a 1,4-sorew (4-hydroxy cumyl benzene), 1,1,3-tris(4-hydroxyphenyl) butane, 1,1,2,2-tetra(4-hydroxyphenyl) ethane, Thibis phenol, a sulfobisphenol, a oxybisphenol, phenol novolac, orthocresolnovolac, ethylphenol novolac, butylphenol novolac, octylphenol novolac, resorcinol novolac, The PORIGU lysyl-ether compound of polynuclear polyhydric phenol compounds, such as terphenediol; To the above-mentioned mononuclear polyhydric phenol compound or a polynuclear polyhydric phenol compound, poly glycidyl ether compound [of ECHRENOKISHIDO and/or a propylene oxide addition]: The poly glycidyl ether compound of the hydrogenation thing of the above-mentioned mononuclear polyhydric phenol compound; Ethylene glycol, Propylene glycol, a butylene glycol, hexandiol, polyglycol, Thiodiglycol, glycerin, trimethylolpropane, pentaerythritol, Poly glycidyl ether of the polyhydric alcohol class of sorbitol, a bisphenol A-ethylene oxide addition, etc.; Maleic acid, Fumaric acid, itaconic acid, succinic acid, glutaric acid, suberic acid, adipic acid, Aliphatic series, such as azelaic acid, sebacic acid, dimer acid, trimer acid, phthalic acid, isophthalic acid, terephthalic acid, trimellitic acid, trimelic acid, pyromellitic acid, tetrahydrophthalic acid, hexahydrophthalic acid, and methylene tetrahydrophthalic acid, Glycidyl ester species [of aromatic series or alicycle fellows polybasic acid] and homopolymer [of glycidyl methacrylate] or copolymerN, and N-diglycidyl aniline, The epoxy compound which has glycidyl amino groups, such as bis(4-(N-methyl-N-glycidyl amino) phenyl) methane; Vinylcyclohexene diepoxide, JISHIKURO pentadiene diepoxide, 3,4-epoxycyclohexylmethyl 3,4-epoxy cyclohexane carboxylate, 3,4-epoxy-6-methylcyclohexylmethyl-6-methylcyclohexane carboxylate, The epoxidation thing of cyclic olefin compounds, such as bis(3,4-epoxy-6-methylcyclohexylmethyl)horse mackerel peat; Epoxidation polybutadiene, Heterocyclic compounds, such as epoxidation conjugated diene polymers, such as epoxidation styrene butadiene copolymer, and triglycidyl isocyanurate, are raised. Internal bridge construction of these epoxy resins could be carried out by the prepolymer of the end isocyanate.

[0011]Also in the above-mentioned epoxy compound, especially Aliphatic series poly glycidyl ether, When ethylene oxide of bisphenols and/or poly glycidyl ether of a propylene oxide addition, and poly glycidyl ether of hydrogenation bisphenols are used, since the resin composite which is excellent in corrosion resistance, chemical resistance, the adhesion to a base material, etc. is obtained, it is especially desirable.

[0012]The epoxy compound used for this invention has the weight per epoxy equivalents 100-2000 and also a preferred thing of 150-1500. There is a possibility that hardenability may fall [this weight per epoxy equivalent] by less than 100, and in being larger than 2000, there is a possibility of having an adverse effect on hardened material physical properties.

[0013]The compound of the (b) ingredient of this invention is a compound which has in a molecule a basis which can react to one or more alkoxy silyl groups and one or more epoxy groups. As the above-mentioned alkoxy silyl groups, they are JI or a bird. [C1-4] An alkoxy silyl group is preferred, and although the basis etc. which an amino group, a sulphydryl group, a carboxylic acid group, etc. combined with the silicon atom via the hydrocarbon group of C1 - 30 as a basis which can react to the above-mentioned epoxy group are raised, an amino alkyl group is preferred. As a compound of the above-mentioned (b) ingredient,

specifically, For example, aminomethyl triethoxysilane, gamma-aminopropyl triethoxysilane, gamma-aminoisobutyl trimethoxysilane, N-(beta-aminoethyl) aminomethyl trimethoxysilane, N-(beta-aminoethyl) aminomethyl triethoxysilane, N-(beta-aminoethyl) aminopropyl trimethoxysilane, N-(amino alkyl) amino alkoxy silane, gamma-aminopropyl methyltriethoxysilane, N-(beta-aminoethyl)-gamma-aminopropyl

methylmethoxysilane, etc. are raised.

[0014](*) of this invention — although it adds the above-mentioned (b) ingredient to the above-mentioned (a) ingredient, since the adhesion of an ingredient to various raw materials improves more by adding (c) carboxylic acid further, it is desirable.

[0015] although the carboxylic acid more than mono- ** JI and trivalent is raised as carboxylic acid of the above-mentioned (c) ingredient — dicarboxylic acid — the inside of all the carboxylic acid components, and more than 10 mol % — by using it, since the effect of improving film properties, such as adhesion and solvent resistance, becomes remarkable, it is desirable.

[0016] As dicarboxylic acid, here, for example Oxalic acid, succinic acid, Glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, Saturation or unsaturated dicarboxylic acid, such as sebacic acid, fumaric acid, maleic acid, and decane dicarboxylic acid, is raised. Long-chain dicarboxylic acid is preferred and as such a thing especially, for example Dimer acid (hydrogenation) etc., Or P-1013 (made by Uniqema), P-1025 (made by Uniqema), JPU-22 (product made from Okamura Oil Mill), ULB-20 (product made from Okamura Oil Mill), etc. can use conveniently as a commercial item.

[0017] As carboxylic acid other than the above, or other carboxylic acid which can be used together with the above-mentioned dicarboxylic acid, For example, acetic acid, butanoic acid, a valeric acid, caproic acid, enanthic acid, caprylic acid, 2-ethylhexyl acid, pelargonic acid, neo decanoic acid, capric acid, Undecanoic acid, lauric acid, tridecanoic acid, myristic acid, palmitic acid, Isostearic acid, stearic acid, 12-hydroxystearic acid, Arachin acid, behenic acid, lignoceric acid, acrylic acid, methacrylic acid, Cericnic acid, obtusilic acid, KAPUJO lane acid, undecylenic acid, Linder acid, Tsuzuo acid, FIZETERIN acid, myristoleic acid, palmitoleic acid, a petroselinic acid, Oleic acid, elaidic acid, ASUKUREPIN acid, vaccenic acid, gadoleic acid, Gondo Inn acid, a cetoleic acid, erucic acid, brassic acid, selacholeic acid, KISHIMEN acid, RUMEKUEN acid, HIRAGO acid, linalenic acid, MOROKUCHI acid, steer RIDON acid, Although the saturation or unsaturation monocarboxylic acid which can be replaced with hydroxyl with the straight chain of arachidonic acid, clupanodonic acid, herring acid, ricinoleic benzoic acid, toluic acid, etc., branching, or 1-30 annular carbon atoms is raised, suitably, What contains in a molecule the unsaturated carboxylic acid which has a double bond is preferred, divides, and as monocarboxylic acid, That the unsaturated carboxylic acid which has a conjugate double bond more than a couple is included in a molecule as unsaturated carboxylic acid which is preferred and has a conjugate double bond more than a couple in these molecules, For example, sorbic acid, the transformer 2, ****- 4-decadienoic acid, the transformer 10, transformer 12-octadecanoic acid, Natural fat acid, such as alpha-eleostearic acid, beta-eleostearic acid, and punicic acid, or synthetic unsaturated fatty acid ***** which has a conjugate double bond with 5-22 carbon atoms.

[0018](a) Although not limited from an ingredient, the (b) ingredient, and the (c) ingredient, especially concerning the method of manufacturing the modified epoxy resin of a (b) ingredient, suitably. After making the (a) ingredient and the (c) ingredient react if needed (reaction 1) and considering it as a partial esterification epoxy compound, it is easily manufactured by making the (b) ingredient react (reaction 2). When the reaction 1 and the reaction 2 are shown still in detail, the reaction 1, The epoxy compound of an ingredient, the carboxylic acid of the (c) ingredient, and also if needed (a) An esterification catalyst. By making it react at 80-150 ** in a non-solvent or a solvent, can use polymerization inhibitor, can carry out easily and the reaction 2, The alkoxy silane compound of the (b) ingredient can be added to the reactant of the above-mentioned (a) ingredient or the (a) ingredient, and the (c) ingredient, and it can carry out easily by making it react at 80-150 ** in a non-solvent or a solvent.

[0019](*) of this invention — as for especially the modified epoxy resin of an ingredient, it is preferred that the (b) ingredient is added to 1 Eq of epoxy groups of the (a) ingredient in the range which is 0.2-0.9 Eq as for 0.1-1.0 Eq of active hydrogen. (b) When the addition amount of an ingredient is less than 0.1 Eq, there is a possibility that the solvent resistance of a coat may fall. As for especially the addition amount, when also making the (c) ingredient add, it is preferred that 0.1-0.9 Eq of carboxyl groups are the range of 0.2-0.85 Eq about the (c) ingredient to 1 Eq of epoxy groups of the (a) ingredient. (c) When the addition amount of an ingredient is less than 0.1 Eq, there is a possibility that the effect by using it may not fully be acquired. It is preferred that 0.8 Eq or more of sum total addition amounts of the active hydrogen of the (b) ingredient and the carboxyl group of the (c) ingredient are especially 0.9 Eq or more to 1 Eq of epoxy groups of the (a) ingredient. (b) And since there is a possibility that the sum total addition amount of the (c) ingredient may have an adverse effect on hardenability or coat performance in less than 0.8 Eq, it is not desirable.

[0020] Here as an esterification catalyst used in the above-mentioned reaction 1. For example, lithium methacrylate, potassium carbonate, magnesium oxide, Zinc chloride, boron fluoride, an aluminium chloride, http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web.cgi?http%3A%2F%2Fwww4.ipdl.inpit.go... 2010/10/19

chlorination tin, NN-dimethylbenzylamine, The third class amine, such as NN-dimethyl phenylamine and triethylamine, 1, secondary amine, trimethyl benzylammonium chloride, the 4th class amine, The 4th class phosphonium salt, N-N phenylmethylamine, an anion exchange resin and pyridine, The 4th class pyridinium salt, NN-dimethylethanamine, dimethylamino methacrylate, 4th class ammoniumchloride + chromium, an amide compound, triphenyl phosphine, Phosphorus compounds, such as tributyl phosphine, triphenyl SUCHIBEN, vanadium chloride, phenothiazin, chrome oxide, an organic acid chromium compound, ferric chloride, iron hydroxide, an anion exchange resin, etc. are raised.

[0021] As polymerization inhibitor used in the above-mentioned reaction 1, For example, p-benzoquinone, anthraquinone, a naphthoquinone, phenan surra quinone, p-xyl quinone, p-toluene, 2,8-dichloroquinone, 2,6-diphenyl-p-benzoquinone, 2,5-diacetoxyp-benzoquinone, 2,5-diacetoxyp-p-benzoquinone, Quinone, such as 2,5-Zia ***** p-benzoquinone; Hydroquinone, p-t-butylcatechol, 2,5-di-tert-butylhydroquinone, Hydroquinone, such as monomethyl hydroquinone and 2,5-di-tert-amylyhydroquinone; Di-t-butyl PARAKU resoi, Copper compounds, such as phenols; naphthene copper, such as hydroquinone; monomethyl ether and alpha-naphthol; Phenyl-beta-naphthylamine, Paraben JIRUAMINO phenol, a di-beta-naphthyl p phenylenediamine, Oxime, such as nitro compound; quinonedioxime, such as amines; dinitrobenzenes, such as dibenzylhydroxylamine, phenylhydroxylamine, and diethylhydroxylamine, trinitrotoluene, and picric acid, and cyclohexanone dioxime; A clo pen, Phenothiazin etc. are raised.

[0022] As an alkyl group which the (**) ingredient of this invention is an alkoxy silane compound expressed with the above-mentioned general formula (I), and is expressed with R1, For example, as an alkyl group

which bases, such as methyl, ethyl, propyl, and butyl, are raised and is expressed with R₂, For example, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, benzyl, etc. are raised, and bases, such as a methoxy tolyl, and xylol, are raised as an aryl group. As these alkoxy silane compounds, for example A tetramethoxy silane, A tetraethoxysilane, tetra propoxysilane, tetra butoxysilane, Methyl trimethoxysilane, methyl triethoxysilane, a methyl tripropoxy silane, Methyl bird butoxysilane, ethyltrimethoxysilane, ethyltriethoxysilane, propyltrimethoxysilane, propyl triethoxysilane, phenyltrimethoxysilane, phenyltriethoxysilane, these condensates, etc. are raised.

[0023] In this invention, the blending ratio of a (b) ingredient and a (**) ingredient, It is preferred (b)/(**) = 10 / 1 - 1/5, and that it is especially the range of 5 / 1 - 1/3 at a weight ratio, and the hardened material which was more excellent in hardenability and was excellent in film properties, such as adhesion, a water resisting property, and solvent resistance, by being used together in this range can be provided.

[0024] Here — (**) — the alkoxy silane compound which is an ingredient, and (**) — although it does not limit in particular for a mixed stage with an ingredient, since teaching a (**) ingredient when adding the (b) ingredient to the (a) ingredient can also act as a reactional solvent, it is effective.

[0025] It can be dissolved in an organic solvent by the resin composite which consists of the (b) ingredient and (**) ingredient of this invention if needed.

[0026] As the above-mentioned organic solvent, for example Methyl ethyl ketone, methyl amyl ketone, A diethyl ketone, acetone, methyl isopropyl ketone, propylene-glycol-monomethyl-ether acetate, Ketone, such as cyclohexanone; A tetrahydrofuran, 1, 2-dimethoxyethane, Ether, such as 1,2-diethoxyethane; Ester species; ****- or n-butanol, such as ethyl acetate and n-butyl acetate, Alcohols, such as ****- or n-propanol, and amyl alcohol; Benzene, Aromatic hydrocarbon, such as toluene and xylene; Spirit of turpentine, D-limonene, Terpene hydrocarbon oils, such as pinene; A mineral spirit, SUWAZORU#310 (product made from KOSUMO Matsuyama Petroleum), Paraffin series solvents, such as Solvesso #100 (product made from Exxon Chemistry); A carbon tetrachloride, Halogenated aromatic hydrocarbon, such as halogenated aliphatic hydrocarbon; chlorobenzene, such as chloroform, trichloroethylene, and a methylene chloride; aniline, triethylamine, pyridine, dioxane, acetic acid, acetonitrile, carbon bisulfide, etc. are raised. [0027] 10-200 weight-section use of the amount of the above-mentioned organic solvent used is preferably carried out to total quantity 100 weight section of (b) and a (**) ingredient. When the amount of this [used] exceeds 200 weight sections, since it volatilizes and danger, hazardous property, etc. are generated, it is not desirable.

[0028] A polymerization nature monomer, a film formation auxiliary agent, etc. can be blended with the resin composite of this invention.

[0029] As the above-mentioned polymerization nature monomer, acrylic acid, methacrylic acid, methacrylic acid hydroxy alkyl ester, etc. are raised, for example.

[0030] As the above-mentioned film formation auxiliary agent, an acrylic ester copolymer, a polyvinylidene chloride, a styrene acrylonitrile copolymer, a vinyl copolymer, a vinyl acetate copolymer, an acrylic silicon copolymer, etc. are raised, for example.

[0031] There is no restriction in particular in the method of preparing a paint using the resin composite of this invention, and the usual method of preparing a general paint can be used. After the obtained paint blends a curing catalyst or an initiator, it can be applied with a spray system, brush coating, and roller coating, and can make a coat form ordinary temperature or by making it heat and harden.

[0032] As the above-mentioned curing catalyst, here, for example Calcium naphthenate, copper naphthenate, Manganese naphthenate, lead naphthenate, cobalt naphthenate, naphthenic acid tin. They are raised by carboxylic acid metal salt, such as octylic acid calcium, copper octylate, octylic acid manganese, lead octylate, octylic acid cobalt, and tin octylate, etc., and as the above-mentioned initiator, For example, hydro-peroxide, such as cumene peroxide; Diacyl peroxide, Ketone peroxide, such as methylethyl peroxide and benzoyl peroxide; Peroxy carbonate; 1, such as bis(4-tertiary butyl cyclohexyl)peroxy carbonate, the third butylperoxy 3 and 3 of 1-Jl, 5-trimethylcyclohexane, Peroxy ketals, such as the third butylperoxy cyclohexane of 1,1-Jl, peroxy ester or these mixtures, such as the third butylperoxy benzoate and third butylperoxy 2-ethylhexanoate, etc. can be used.

[0033] To the resin composite of this invention, if needed Monoglycidyl ether: Dioctyl phthalate, dibutyl phthalate, benzyl alcohol. The diluent of reactivity or nonresponsiveness, such as coal tar (plasticizer);

Glass fiber, Carbon fiber, cellulose, silica, cement, kaolin, clay, aluminium hydroxide, Bentonite, talc, silica, impalpable powder silica, a titanium dioxide, carbon black, A bulking agent or paints; thickening agent;

CHIKISOTOROPIKKU agent; fire retardant; defoaming agent; rust preventives, such as graphite, iron oxide, and a bitumen substance; Colloidal silica. The additive of daily use of colloidal alumina etc. may be contained and the adhesive resin of xylene resin, petroleum resin, etc. can also be further used together.

[0034] The resin composite of this invention, for example Concrete, cement mortar. The paint or adhesives to various metal, leather, glass, rubber, a plastic, a tree, cloth, paper, etc.; The adhesive tape for a package, A pressure sensitive adhesive label, a frozen-foods label, a removal label, a POS label, adhesion wallpaper. The binder of adhesion flooring; Art paper, a light weight coat paper, a cast-coated paper, coating paperboard, Fiber processing agents, such as convergence agents, such as converted paper; natural fibers,

such as a carbonless copying machine and an impregnated paper, a synthetic fiber, glass fiber, carbon fiber, and a metal fiber, a fray inhibitor, and a processing agent; although it can be used for extensive uses, such as building materials, such as a sealing material, cement admixture, and a water blocking material. Especially since the coat excellent in anti-corrosiveness, adhesion, hardenability, and solvent resistance can be given, it is used for the use of a paint.

[0035] [Working example] Although an embodiment, a comparative example, and the example of a use examination are shown and the resin composite of this invention is explained still in detail hereafter, this invention is not limited to these.

[0036] Embodiment 1 ADEKA resin EP-4005 (; by Asahi Denka Kogyo K.K. — the glycidyl ether compound of the propylene oxide addition of bisphenol A.) Weight per epoxy equivalent 525 413g. KBE-903 (product made from Shin-etsu Chemistry, aminopropyl triethoxysilane) 87g, and MS-51 (Mitsubishi Chemical make; tetramethyl silicate oligomer) 450g are taught. It reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 1 was obtained.

[0037] Embodiment 2 ADEKA resin EP-4005 377g and P-1013 (Uniqema; — dimer acid.) Taught acid equivalent 295 69g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 900-950. It is KBE-903 here. 54 g and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 2 was obtained.

[0038] Embodiment 3 ADEKA resin EP-4000 (; by Asahi Denka Kogyo K.K. — the glycidyl ether compound of the propylene oxide addition of bisphenol A.) Weight per epoxy equivalent 325 301g and P-1013 Taught 145 g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 1000-1050. It is KBE-903 here. 54 g and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 3 was obtained.

[0039] Embodiment 4 ADEKA resin EP-4005 289g and ADEKA resin EP-4100 (; by Asahi Denka Kogyo K.K. — the glycidyl ether compound of bisphenol A.) Weight per epoxy equivalent 190 48g and P-1013 Taught 109 g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 1000-1050. It is KBE-903 here. 54 g and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 4 was obtained.

[0040] Comparative example 1 ADEKA resin EP-4005 392 g and KBE-903 83 g and 450 g of xylene were taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 5 was obtained.

[0041] Comparative example 2 ADEKA resin EP-4005 Taught 496 g, the dimer acid 131 g, and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 900-950. MS-51 350g was taught here and it mixed at 90-100 ° for 5 hours. This was cooled to 80 °, 25 g of ethanol was added, it mixed for 30 minutes, and the comparison resin composite 2 was obtained.

[0042] The following examinations were done using the resin composites 1-10 obtained by the example of use examination above-mentioned embodiment, and the comparative example, and the comparison resin composites 1-2. However, in the case where the comparison resin composite 2 obtained by the

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and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 4 was obtained.

[0043] Embodiment 5 ADEKA resin EP-4005 416 g and P-1013 Taught 30 g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 600-650. It is KBE-903 here. 76 g and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 5 was obtained.

[0044] Embodiment 6 ADEKA resin EP-4005 306 g and P-1013 Taught 140 g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 4000-4050. It is KBE-903 here. 12 g and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 6 was obtained.

[0045] Embodiment 7 ADEKA resin EP-4005 390g and IPU-22 (; made from Okamura Oil Mill — an unsaturated-dicarboxylic-acid mixture.) Taught acid equivalent 183 56g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 1000-1050. It is KBE-903 here. 56 g and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 7 was obtained.

[0046] Embodiment 8 ADEKA resin EP-4005 392g and ULB-20 (; made from Okamura Oil Mill — an unsaturated-dicarboxylic-acid mixture.) Taught acid equivalent 171 54g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 1000-1050. It is KBE-903 here. 54 g and MS-51 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 8 was obtained.

[0047] Embodiment 9 ADEKA resin EP-4005 372 g and ULB-20 54 g, High diene (the product made from KF trading, about 47 to 53% of main-ingredients 9,10-octadecadienoic acid) in addition, (about 34 to 40% of disconjugation octadecadienoic acid, monoene one, or 10 to 15% of saturated fatty acid), Taught acid equivalent 275 74g and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 2500-2550. It is KBE-90354g and MS-51 here. 450 g was taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 9 was obtained.

[0048] Embodiment 10 ADEKA resin EP-4080 (; by Asahi Denka Kogyo K.K. — hydrogenation bisphenol diglycidyl ether.) Taught weight per epoxy equivalent 245 348g, P-1025 (Uniqema make; hydroxylation dimer acid, acid equivalent 295) 63g, and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 2500-2550. KBE-90389g and MS-51450g were taught here, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the resin composite 10 was obtained.

[0049] Comparative example 1 ADEKA resin EP-4005 392 g and KBE-903 83 g and 450 g of xylene were taught, and it reacted at 90-100 ° for 5 hours, it checked that the weight per epoxy equivalent had exceeded 100,000, and the reaction was ended. This was cooled to 80 °, 50 g of ethanol was added, it mixed for 30 minutes, and the comparison resin composite 1 was obtained.

[0050] Comparative example 2 ADEKA resin EP-4005 Taught 496 g, the dimer acid 131 g, and 0.25 g of triphenyl phosphine, and it was made to react by 130-140 ° and 30 mmHg or less for 3 hours, and checked that they were the weight per epoxy equivalents 900-950. MS-51350g was taught here and it mixed at 90-100 ° for 5 hours. This was cooled to 80 °, 25 g of ethanol was added, it mixed for 30 minutes, and the comparison resin composite 2 was obtained.

[0051] The following examinations were done using the resin composites 1-10 obtained by the example of use examination above-mentioned embodiment, and the comparative example, and the comparison resin composites 1-2. However, in the case where the comparison resin composite 2 obtained by the

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comparative example 2 is used, triethylenetetramine was used together by the ratio of weight per epoxy equivalent/active hydrogen =1/1.
[0049](Toluene-proof nature) The resin composite was applied by 100-micrometer thickness on the tin sheet, it was neglected on the 1st, the cured film was created, and the following standard estimated the state of the coat after performing toluene rubbing to this 10 times.

5: The coat remains thoroughly.
4: 1 which 2-coat which 3-coat which the coat will not dissolve slightly (5% or less of area) will not dissolve for a while (6 to 20% or less of area) will not dissolve mostly (not less than 21% of area) : a coat is lost.
[0050](Water resisting property) The resin composite was applied by 100-micrometer thickness on the tin sheet, it was neglected on the 1st, the cured film was created, and the following standard estimated the state of the coat after immersion for this for three days in water.

5: With [a coat] no abnormalities.
4: A float is seen for a coat slightly (5% or less of area).
3: A float is seen for a coat for a while (6 to 20% or less of area).
2: There are many coats (not less than 21% of area), and a float is seen.

1: A coat separates thoroughly.
[0051](Mortar adhesion, mortar secondary adhesion) A resin composite is applied by 100-micrometer thickness on a mortar board, it was neglected on the 1st, the cross cut of the cured film was created and carried out, the following standard estimated the peeling condition in the tape (mortar adhesion), and this was similarly evaluated to the coat after immersion for three days in water (mortar secondary adhesion).

5: With [a coat] no abnormalities.
4: A float is seen for a coat slightly (5% or less of area).
3: A float is seen for a coat for a while (6 to 20% or less of area).
2: There are many coats (not less than 21% of area), and a float is seen.

1: A coat separates thoroughly.
[0052](Light-calcium-carbonate board adhesion) The resin composite was applied by 100-micrometer thickness on the light-calcium-carbonate board, it was neglected on the 1st, the cross cut of the cured film was created and carried out, and the following standard estimated the peeling condition in the tape.

5: With [a coat] no abnormalities.
4: A float is seen for a coat slightly (5% or less of area).
3: A float is seen for a coat for a while (6 to 20% or less of area).
2: There are many coats (not less than 21% of area), and a float is seen.

1: A coat separates thoroughly.
[0053](Wet surface mortar adhesion) The resin composite was applied by 100-micrometer thickness on the wet surface mortar board, it was neglected on the 1st, the cross cut of the cured film was created and carried out, and the following standard estimated the peeling condition in the tape.

5: With [a coat] no abnormalities.
4: A float is seen for a coat slightly (5% or less of area).
3: A float is seen for a coat for a while (6 to 20% or less of area).
2: There are many coats (not less than 21% of area), and a float is seen.

1: A coat separates thoroughly.
[0054](Wet surface light-calcium-carbonate board adhesion) The resin composite was applied by 100-micrometer thickness on the wet surface light-calcium-carbonate board, it was neglected on the 1st, the cross cut of the cured film was created and carried out, and the following standard estimated the peeling condition in the tape.

5: With [a coat] no abnormalities.
4: A float is seen for a coat slightly (5% or less of area).
3: A float is seen for a coat for a while (6 to 20% or less of area).
2: There are many coats (not less than 21% of area), and a float is seen.

1: A coat separates thoroughly.
[0055]It is the following about an obtained result. It was shown in [Table 1].
[0056]
[Table 1]

	実 施 例										比較例	
	1	2	3	4	5	6	7	8	9	10	1	2
耐トルエン性	4	5	5	5	5	5	5	5	5	5	4	3
耐水性	4	5	5	5	5	5	5	5	5	5	4	5
モルタル	5	5	5	5	5	5	5	5	5	5	5	3
密モルタル二次	4	5	5	5	5	5	5	5	5	5	4	2
着經カル板	5	5	5	5	5	5	5	5	5	5	4	2
性泡潤面モルタル	4	5	5	5	5	5	5	5	5	5	2	1
造面經カル	4	5	5	5	5	5	5	5	5	5	2	1

[0057]When the comparison resin composite 1 of the comparative example 1 which does not contain a (**) ingredient only of a (b) ingredient is used so that more clearly than the above-mentioned result, Even if adhesion to the painted surface is insufficient and it is using together an epoxy resin and a tetra alkoxy silane compound, also when the comparison resin composite 2 of the comparative example 2 containing an epoxy resin which the (b) ingredient has not added is used as an epoxy resin, adhesion has the fault of being inferior.

[0058]On the other hand, when the resin composites 1-10 of this invention of Embodiments 1-10 are used, Excel in hardenability, excel in solvent resistance and adhesion to all fields, and it divides, (a) When the resin composites 2-10 of Embodiments 2-10 which consist of a modified epoxy resin of a (b) ingredient and tetra alkoxy silane of a (**) ingredient which are produced by adding the (b) alkoxy silane compound and (c) dicarboxylic acid to an epoxy compound are used, especially, It excels in adhesion to a wet surface.

[0059]
[Effect of the Invention]The resin composite of this invention has a quick cure rate, and the paint excellent in anti-corrosiveness, adhesion, hardenability, solvent resistance, and hardened material physical properties can be given.

[Translation done.]